

## FIBER OPTIC DATA SYSTEMS

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Abstract

This paper is an overview of a continuing data system architecture development effort that started at GSFC with OAST support approximately three years ago. The paper also provides accomplishments and states of the OAST effort and a brief comment on possible future directions. The Space Station Focused Technology (SSFT) program has picked up support of this effort and that portion will be addressed during the SSFT discussions.

The Star bus was originally chosen for investigation because it seemed to offer unique features unavailable with other topologies. It offered a broadcast mode where everyone received the message at the same time and users could come and go at will without affecting the rest of the system in any way. In order to address the reliability issue, we instituted both a component qualification program and redundancy techniques in the BIU design. The major effort in developing a data network has been the FODS contract at Sperry Flight Systems in Phoenix, Arizona. The FODS (Fiber Optic Demonstration System) consists of a fully redundant Star Network with a 100 megabit signaling frequency. The paper presents some performance data on the access protocol utilized and compares it with other access protocols. The status of the qualification effort is presented showing the successful qualification testing of cables, connectors, and some LEDs and PIN diodes. The point of the future directions charts is that we must begin seriously dealing with multiple topologies and methods for smoothly "growing" them from IOC to the growth systems on Space Station.

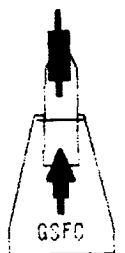
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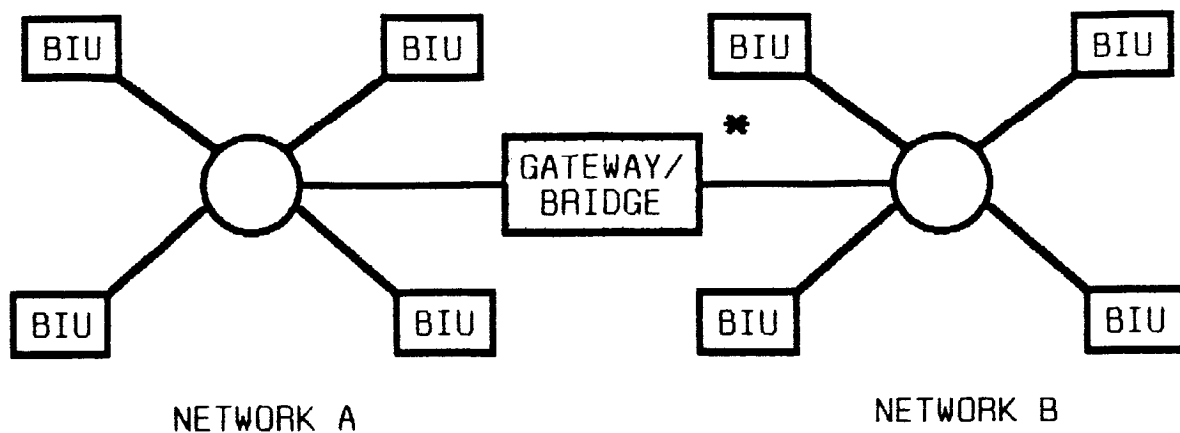
**FIBER OPTIC DATA BUS**

**TECHNOLOGY**



	OAST	SSFT
● STAR BUS TECHNOLOGY	X	
● COMPONENT QUALIFICATION	X	
● NOS/DOS PROTOTYPE		X
● GATEWAY / BRIDGE		X
● VLSI IMPLEMENTATION		X
● FUTURE DIRECTIONS		X





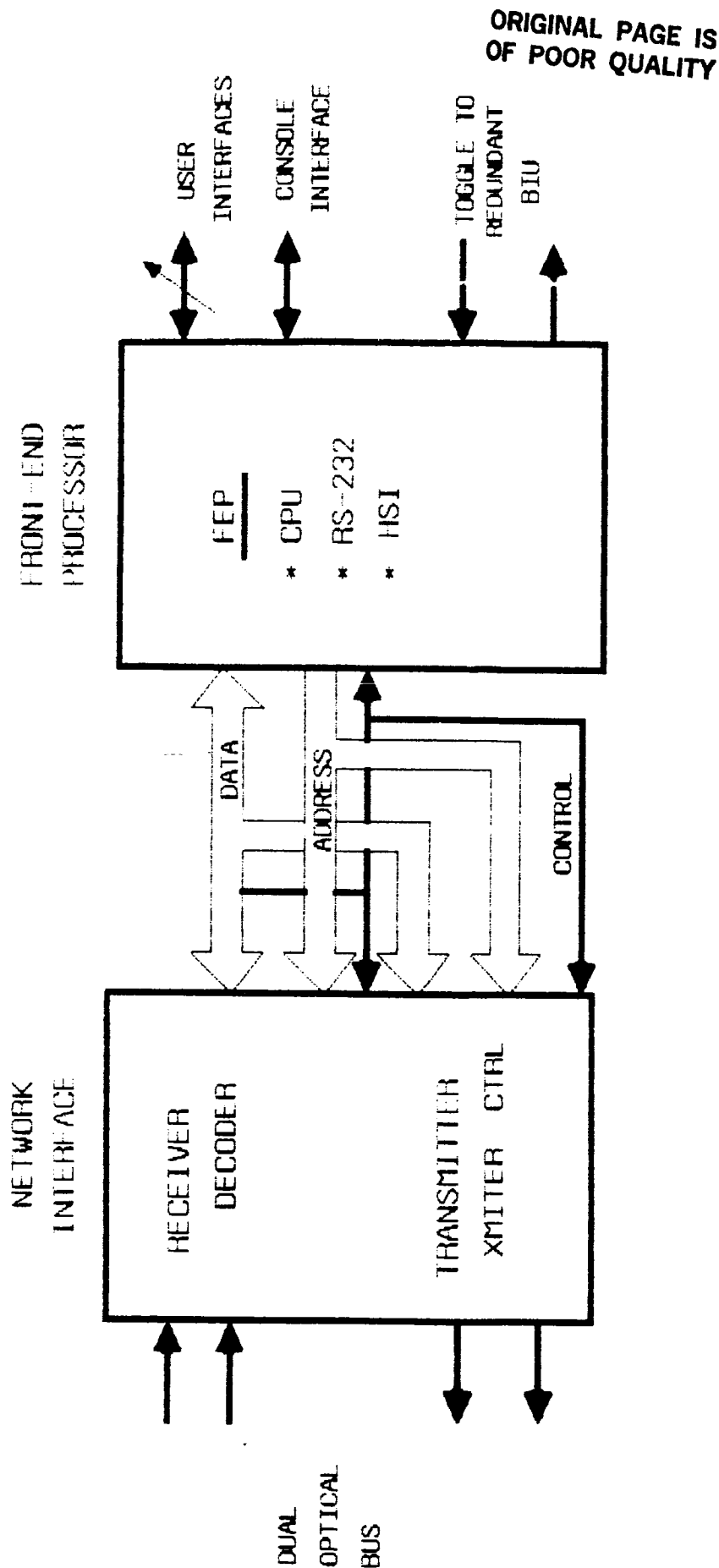
### SPERRY FODS

- 100 MB FIBER OPTIC LAN
- 30 MB MAX / BIU
- CSMA / CD / TS OR TS PROTOCOL
- DISTRIBUTED CONTROL
- DUAL PORTED BIU'S

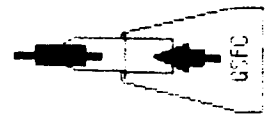
\* TO BE DEVELOPED



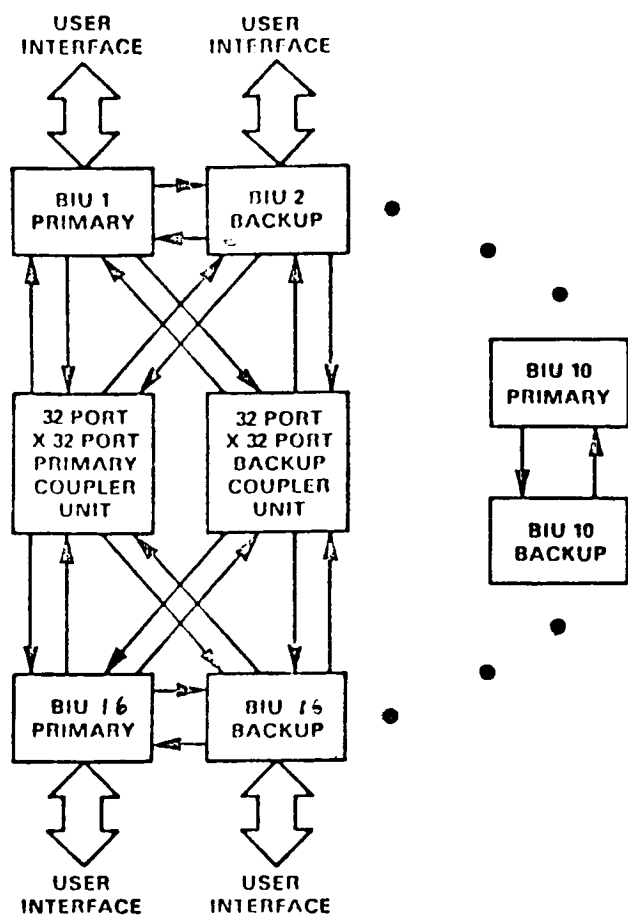
# BIU BLOCK DIAGRAM



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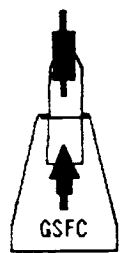


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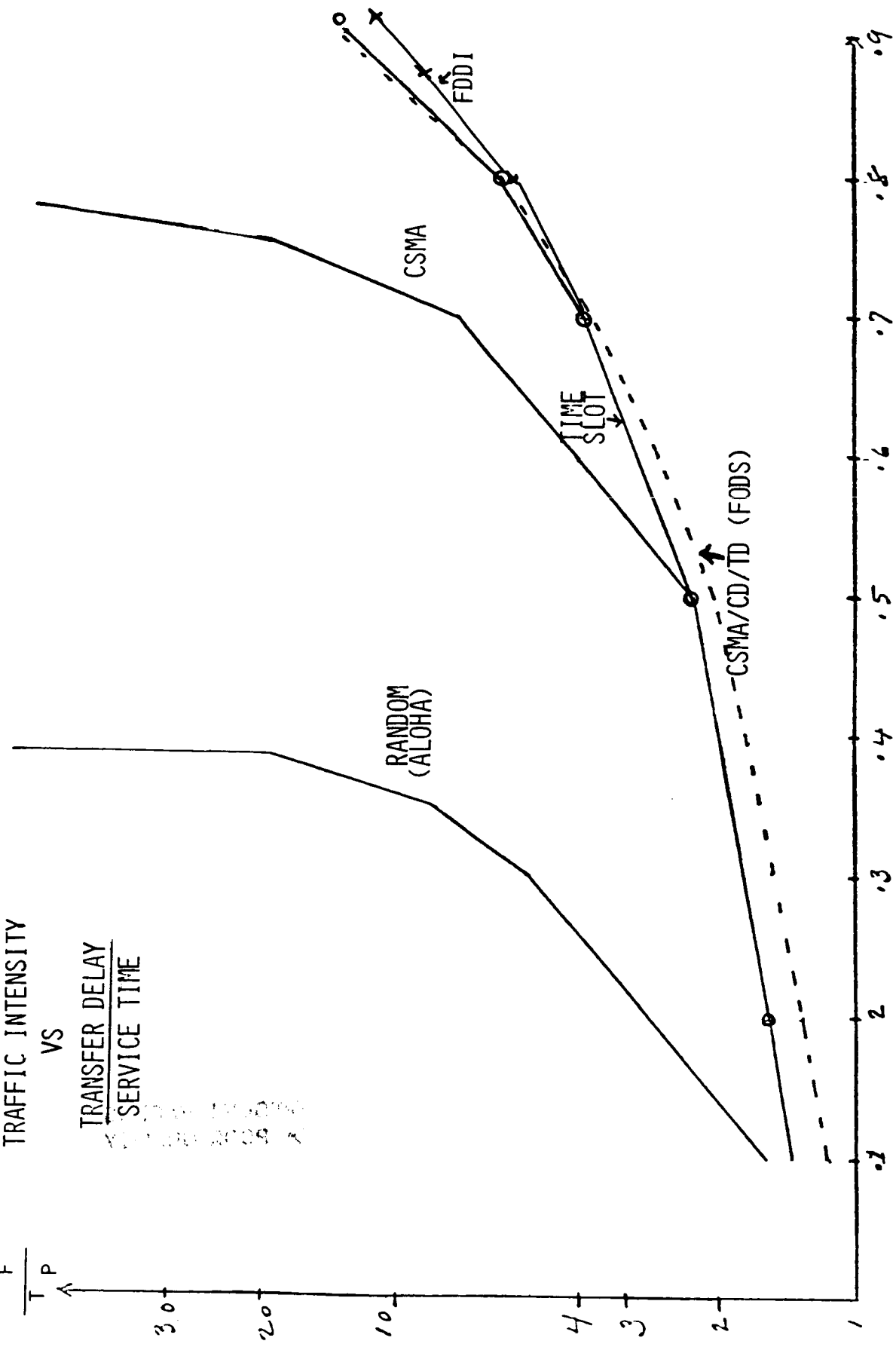
FODS REDUNDANT SYSTEM CONFIGURATION

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$\frac{T_F}{T_P}$

TRAFFIC INTENSITY  
VS  
 $\frac{\text{TRANSFER DELAY}}{\text{SERVICE TIME}}$



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TRAFFIC INTENSITY =  $\frac{\text{SYSTEM THROUGH-PUT}}{\text{SYSTEM CAPACITY}}$

TABLE I

Part #	Part Type	Manufacturer	Test	Results	Status
MFOE 1201	LED/Emitter	Motorola	Qual.	Pass	Report
MFOE 1202	LED/Emitter	Motorola	Screening	----	Test
MFOD 1100	PIN/Detector	Motorola	Qual.	Pass	Report
C30971E*	PIN/Detector	RCA	Analysis	----	Test
SFC-20x20-F*	Coupler	Aetna (ADC)	Evaluation	Pass	Report
OC-1040-10	Cables	Brand Rex	Qual.	Pass	Report
840R	Fiber 200/240	Spectran	Qual.	Pass	Report
200-S	Connector	OFTI	Qual.	Pass	Report
906-122-5003	Connector	Amphenol	Qual.	Pass	Pacer
SFC-32x32-F*	Coupler	ADC	Qual.	----	Procurement

\* Further testing required for flight qualification

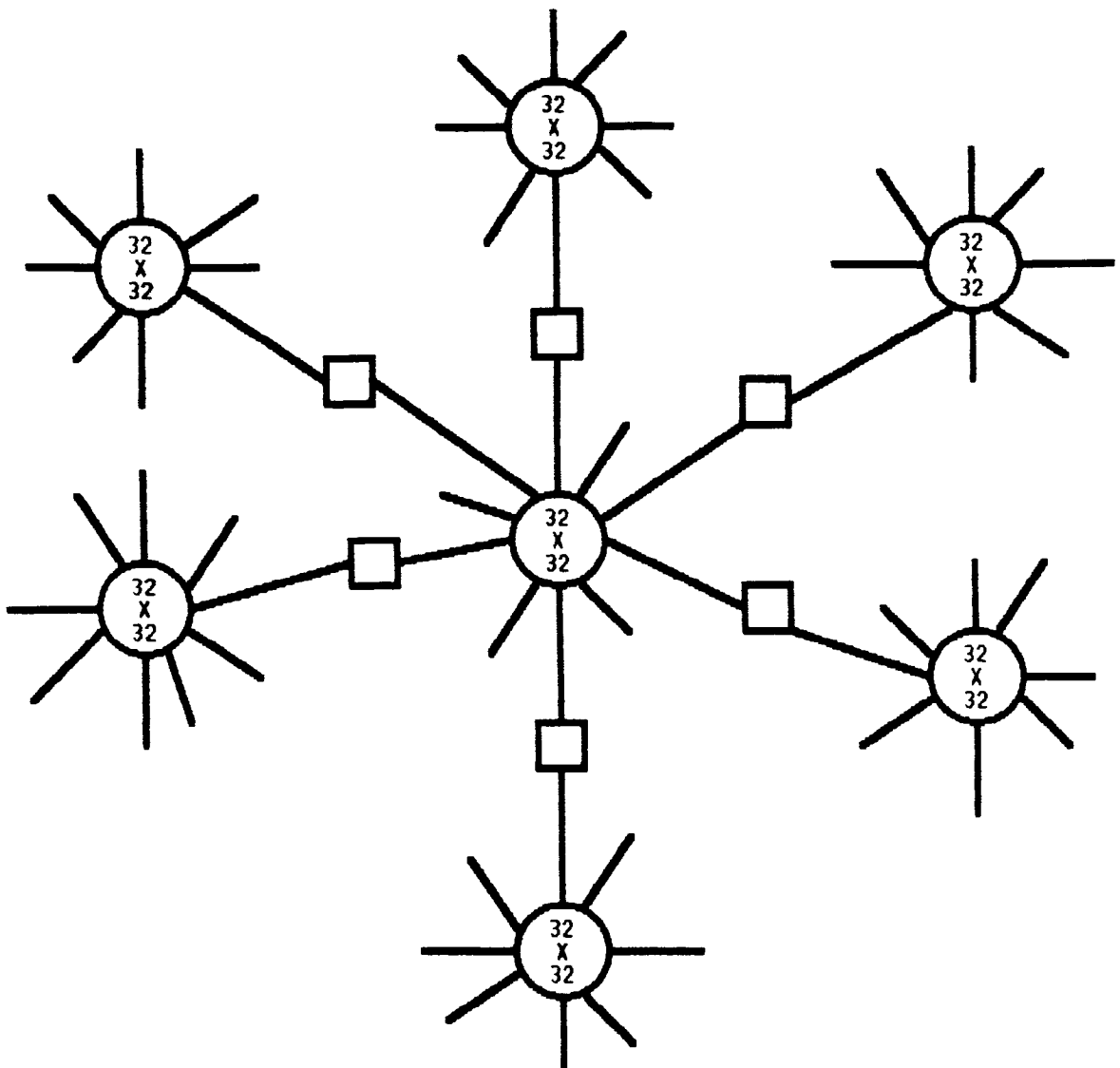
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## **FUTURE DIRECTIONS**

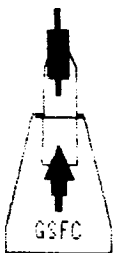
- NEED RELIABILITY
- NEED GROWTH / FLEXIBILITY
- GET AWAY FROM STARBUS

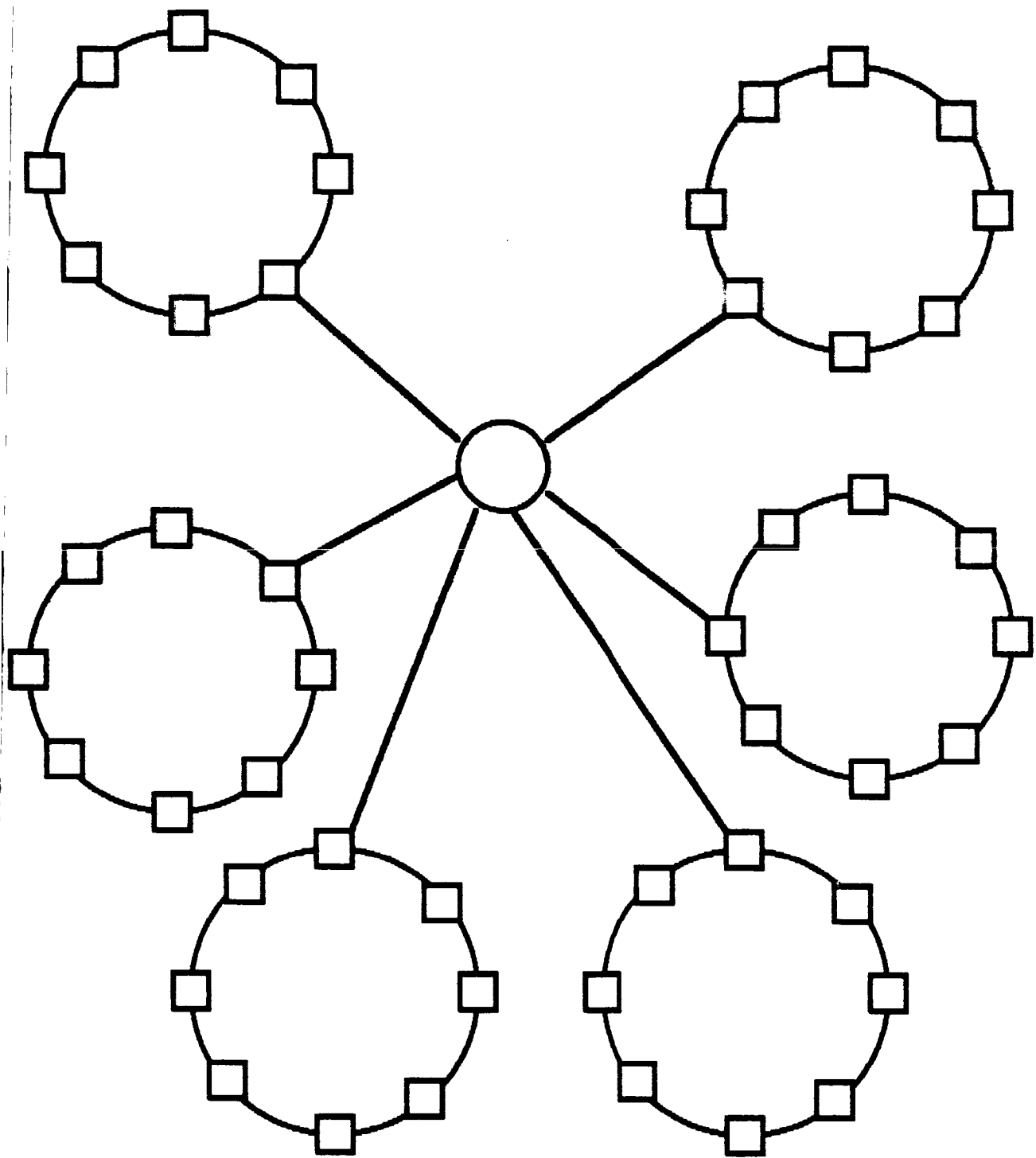




## SUPER STAR

- 32 X 32 = 1024 PORTS ( 992 USER )
- DUAL STARS / BIU's DOUBLE PORTED
- TWO-WAY THRU-WAYS
- TIME DELAYS ALL EQUAL
- TRAFFIC PATTERN SENSITIVE





## STAR RING

